

Management of Saline and Electricity using IOT

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Abstract

The main theme of our project is to reduce the negligence in the hospitals. Sometimes the number of equipment such as fans and lights are kept ON even when not required. Hence, using the device we can reduce the consumption of electricity. Also, due to inattentiveness of the staff members sometimes the level of saline bottle is not kept in track due to which "AERO EMBOLISM" occurs which may lead to heart attack, stroke or respiratory failure. Thus, this paper describes the various ways to control electricity consumption and keep track of the level of saline bottle from distinct places.

Keywords: Ldr, Mqtt Protocol, Ultrasonic Sensors, Temperature Sensor, Arduino Uno Board

INTRODUCTION

This project uses Internet of Things by which we can solve certain Hospital related problems. Hospital uses numerous amount of electrical appliances such as fans, lights and various other medical equipments, which are often kept ON even when not needed. This leads to huge amount of energy loss which in turn has an effect on the environment, hence these kind of problems need to be avoided by taking certain necessary measures. Another major problem related to the hospital is that the nurse or staff has to periodically keep track of the level of saline bottles of patients.

A person who is under treatments, when fed saline it is necessary to make sure that he or she is being monitored frequently or else it may lead to serious consequences. Once the saline bottle is completely fed to the patient, it is mandatory to remove the needle from their body or else this may lead to a pressure difference between the patient's blood flow and the empty saline bottle which will lead to the outward flow of blood back into the saline bottle. Due to

the negligence of the staff members many such incidents have taken place in the past and even now in many hospitals. Thus atleast in the future this kind of problems must be avoided.

In our project we have used certain devices that will help to overcome such type of serious problems and thus reducing the risks in hospitals.

NECESSITY

Smart hospital management is not only about implementing new methods in the hospital. Its about the negligence in the hospitals by the staff members regarding the patients. Its is necessary to reduce the accidents that take place due to the inattentiveness of the staff few times. Even the electricity consumption should be reduced. People often forget to switch OFF the lights and fans after use. This may lead to large amount of electricity consumption. This smart hospital management system helps in overcoming these problems by using few components like temperature sensor, ultrasonic sensor, light dependent resistor, Arduino Uno board etc., which

play their roles in needed situations and help in overcoming the problem.

DESIGN

The design part consists of a combination of devices which help in developing a Smart Hospital. The devices used in our project has various purposes. The devices used in our system include temperature sensor, light dependent resistor, ultrasonic sensor and Arduino Uno.

Each system when gets the data uploads it to the webpage using an MQTT protocol. The temperature sensor fetches the room temperature, the ultrasonic sensor fetches the level of saline bottle and the light dependent resistor sends a message which

says if the light is On/OFF. Once the data is fetched by each device it sends the information to the webpage with the help of an Arduino Uno board. Totally this system reduces the work of the hospital staff and saves the time.

ULTRASONIC SENSOR

Ultrasonic sensor is a kind of acoustic sensor partitioned into three general classifications in particular transmitters, receivers and handsets. Transmitters convert electrical signs to ultrasound signals, beneficiaries convert ultrasound signs to electrical signs and handsets can both transmit and get ultrasound.

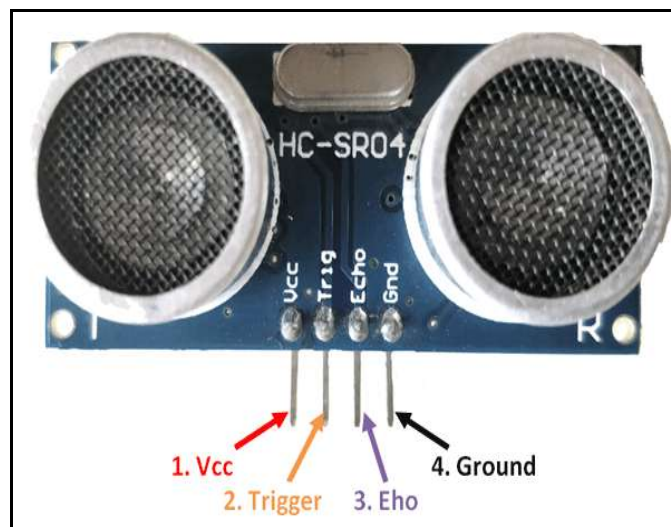


Fig: 1. Ultrasonic sensor HC -SR04

It gives 2cm-400cm non contact estimation work. Its running precision may achieve 3mm. It has 3 fundamental standards:

1. Making utilization of IO trigger for atleast 10us abnormal state flag.
2. The Unit definitely sends eight 40kHz and distinguishes whether there is any heartbeat motion back.
3. If any of the flag is gotten in an abnormal state, time of high yield IO span is the time from sending ultrasonic flag and accepting it back.
4. Test distance = (high level time x velocity of sound(340M/S)2)

LIGHT DEPENDENT RESISTOR (LDR)

A LDR is called as photograph resistor or photograph conductive cell. A LDR is a resistor which controls light.

LDR sensor has two cadmium sulfide photograph conductive cells. A photograph resistor can be connected in light-touchy indicator circuits, light initiated and dim enacted exchanging circuits.

A photoelectric gadget can be either inherent or outward. The opposition of the cell diminishes with expanding light force.

They are found in many products such as cameras, alarm, clock, street lamps and so on. LDR is used to indicate the presence or absence of light or to measure the intensity of light.

In obscurity, their opposition is high, here and there up to $1M\Omega$, however when the LDR sensor is presented to light, the obstruction drops significantly, even down

to a couple of ohms, contingent upon the light power.

The obstruction range and affectability of a photoresistor can significantly contrast among disparate gadgets. Novel photoresistors may respond significantly contrastingly to photons with certain wavelength groups.



Fig: 2. Light Dependent Resistor

ARDUINO UNO BOARD

The Arduino Uno board is a microcontroller board grounded on the ATmega328. It includes 14 advanced

info/yield pins, six simple data sources, 16MHz clay resonator, an assistance for USB availability, a power jack, an ICSP header, and a reset catch.

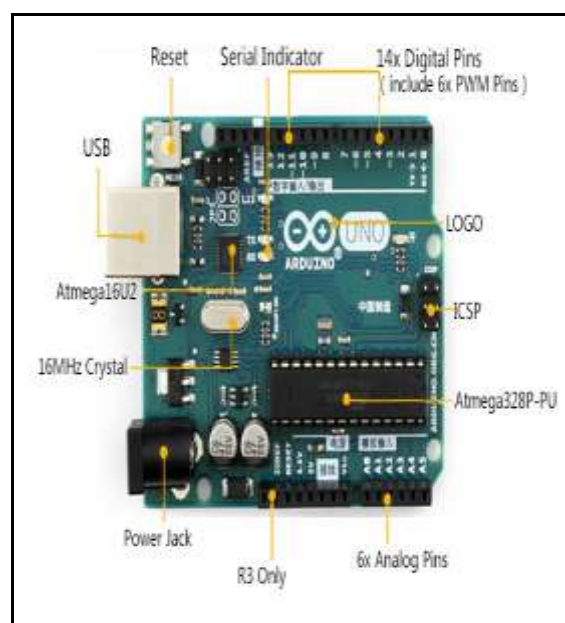


Fig: 3. Arduino Uno board

Its design comprises of assistances that supports the microcontroller in every possible way. In order to get to work with it one has to simply connect it to a computer with a USB cable or power it with an AC to DC adapter or battery.

TEMPERATURE SENSOR (LM35)

It is a gadget that gives a simple yield voltage that is corresponding to outer temperature.

Generally output voltage is given by $V = T \times 10$, where V is in millivolt and T is

in degree centigrade. The low output impedance, linear output and precise inherent calibration makes the device interfacing to read out.

Temperature sensors are utilized in a few applications to be specific HV framework and AC framework ecological controls, medicinal gadgets, sustenance preparing units, concoction taking care of, controlling frameworks, car in the engine observing and so forth.,

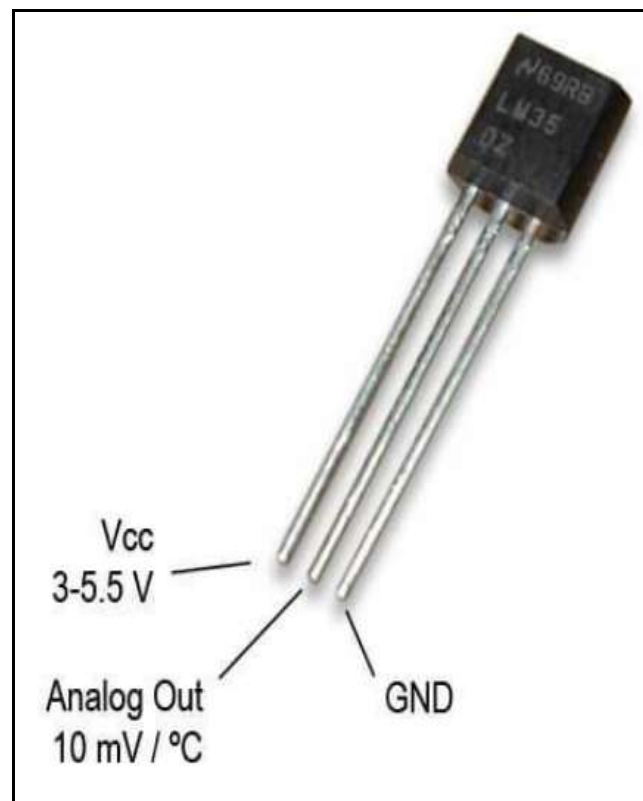


Fig: 4. Temperature Sensor (LM35)

MQTT PROTOCOL

Message Queuing Telemetry Transport is an ISO Standard distribute buy in based informing convention. It deals with best of the TCP/IP convention. It is intended for associations with remote areas where a

"little code impression" is required or the system transfer speed is constrained.

The publish-subscribe-messaging pattern requires a message broker.

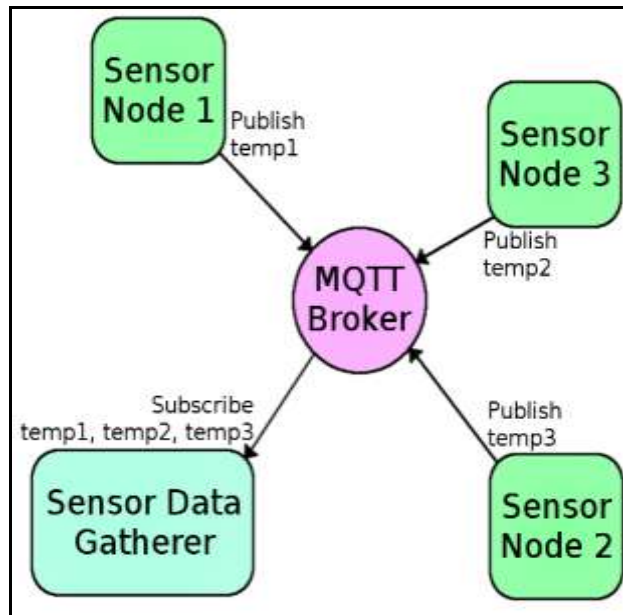


Fig: 5. Mqtt Protocol

IMPLEMENTATION

The system works by collecting the data from:

- 1) Temperature Sensor – consistently screens the temperature of the patient's room.
- 2) Ultrasonic Sensor-consistently screens the level of saline jug.
- 3) LDR-persistently screens power of light.

Every one of the information that is obtained by the above sensors is exchanged to the Arduino super board through the USB. This information is sent to the MQTT server through the ethernet link. One can get to the information from the MQTT server by buying in to the server. MQTT server is utilized to control the switches of the electrical machines.

If the temperature of the patient's room increases above a certain level it will send a message to a web page. In case of saline bottle, the data about the level of saline bottle is periodically sent to the server, which in turn reduces the work of hospital staff of monitoring the patients. Once the level of the saline bottle reaches the specified value, the bottle must be

changed. Using Light Dependent Resistor, we can reduce the consumption of electricity as the resistance of the cell decreases with increasing light intensity. Hence our system helps in reducing the work of the hospital staff and in saving electricity.

CONCLUSION

Our project aims at saving electricity and reducing the work of the hospital staff. It basically works on Internet of Things.

It helps to reduce maintenance cost, environmental pollution and decreases the human involvement. Considering the life and death situation of the patient it is high time that we implement this system on a high scale basis.

The system assures patients safety. Hence, this system can be used in medical sector for high performance.

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